Supporting Access to Health Care

Resilient Emergency Power for Florida Community Health Centers

MAY 2023

Direct Relief

Florida Association of Community Health Centers

CleanEnergy Group

ABOUT THIS REPORT

This report, prepared by Florida Association of Community Health Centers, Inc. (FACHC) and Clean Energy Group (CEG), with input and support from Direct Relief, examines current emergency backup power capabilities of Florida Health Centers, as well as opportunities for resilient power—solar PV paired with battery storage systems—at Health Centers. The report includes technoeconomic survey results for installing and operating solar+storage at seven Health Centers of various sizes across Florida. The report concludes with a discussion of next steps for the Health Centers as well as recommendations for additional health centers and partners interested in replicating this effort.

ACKNOWLEDGEMENTS

This report was made possible through the generous support of Direct Relief. The authors of this report express sincere thanks to Andrew Macalla at Direct Relief as well as Michael Robinson at Direct Relief for his GIS expertise and contributions to this report, to the American Microgrid Solutions team for data analysis, and to Clean Energy Group colleagues Maria Blais Costello, Seth Mullendore, and Anna Adamsson for their thoughtful contributions to this report. David Gerratt of DG Communications designed the report. The views reflected in the report are entirely those of the authors.

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ON THE COVER

Hallways at Bond Community Health Center are shadowed in darkness after a blown fuse as Direct Relief brings medical supplies and funding to the aftermath of Hurricane Michael in the Florida panhandle on Saturday, October 13, 2018.

Photo: Direct Relief

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LEAD ORGANIZATIONS

The Florida Association of Community Health Centers

The Florida Association of Community Health Centers, Inc. (FACHC) is a private, not-for-profit membership association committed to building the capacity of Florida's Community Health Centers in leading the primary care safety net, ensuring equitable access to quality care for all Floridians. Established in 1981, FACHC is the federally designated primary care association (PCA) for Florida authorized by the Health Resources and Services Administration (HRSA), an agency of the US Department of Health and Human Services (HHS). Located in Tallahassee, Florida, FACHC assists Community Health Centers in their provision of high-quality, comprehensive primary care and addressing the full spectrum of patient needs by providing training and technical assistance so Health Centers can focus on patient care. FACHC's Emergency Management Programs provide support for Health Center preparedness, response and recovery efforts through robust communication and coordination to meet identified needs. As an Emergency Support Function (ESF-8) partner within the State Emergency Response Team, FACHC represents Health Centers in collaboration with regional coalitions as well as local, state, and federal agencies.

www.fachc.org

Florida's Health Centers

FACHC represents 54 Health Center organizations (also known as Federally Qualified Health Centers or FQHCs and FQHC Look-alikes), umbrella institutes that represents one or more individual sites, providing services to residents in all 67 counties in Florida at more than 800 sites, including school-based sites and mobile units, and delivering care to more than 1.8 million patients during 7 million patient visits. Health Centers are community-based and patient-directed organizations that provide affordable, accessible, high-quality primary health care services to individuals and families, including people experiencing homelessness, agricultural workers, residents of public housing, the uninsured, and veterans.[1] During emergencies and disasters, Health Centers provide a wide range of services to impacted communities including primary care, mental health and dental care, medications, vaccines, and personal care items that support patient well-being.

Direct Relief

Direct Relief is a global humanitarian organization that works to expand access to medicine and healthcare by equipping health professionals with lifesaving medical resources. Direct Relief has been a longstanding partner of FACHC and worked extensively with Florida's Health Centers on an ongoing basis and in response to emergencies. In 2022 alone, Direct Relief provided 33 Health Center organizations, with 898 shipments of medicine and medical supplies valued at approximately $8 million. In 2021, Direct Relief launched the Power for Health initiative to help nonprofit community health centers and charitable clinics in the US maintain power and remain operational through increasingly common power outages resulting from disasters and electrical grid failures.

www.directrelief.org

1 "What is a Health Center?" *bphc.hrsa.gov*, April 2023, https://bphc.hrsa.gov/about-health-centers/what-health-center, (accessed April 28, 2023).

PROJECT PARTNERS

Clean Energy Group

Clean Energy Group (CEG) is a national nonprofit that works to accelerate an equitable and inclusive transition to a resilient, sustainable, clean energy future. CEG fills a critical resource gap by advancing new energy initiatives and serving as a trusted source of technical expertise and independent analysis in support of communities, nonprofit advocates, and government leaders working on the frontlines of climate change and the clean energy transition. CEG collaborates with partners across the private, public, and nonprofit sectors to accelerate the equitable deployment of clean energy technologies and the development of inclusive clean energy programs, policies, and finance tools.

www.cleanegroup.org

Powered for Patients

Powered for Patients is a nonprofit founded by Eric Cote that leverages Cote's deep understanding of the threats facing emergency power systems operating during extended power outages at critical infrastructure facilities. These insights have led to the development of cutting-edge approaches to better safeguard emergency power and accelerate government, utility, and private sector response when emergency power is threatened during outages. In addition to his support of FACHC's emer-gency power project, Cote has worked with the Florida Hospital Association to advance emergency power resilience work. He also worked with Florida officials in the aftermath of the Hollywood Hills nursing home tragedy following Hurricane Irma in 2017 to address opportunities to bolster emergency power resilience.

www.poweredforpatients.org

Martine Woolley poses for a portrait at the Healthcare Network of Southwest Florida clinic in Naples, Florida on Monday, October 3, 2022.

Photo: Zack Wittman for Direct Relief

OVERVIEW

Emergency Power Access and Opportunities for Florida Health Centers

In 2022, the Florida Association of Community Health Centers (FACHC) set out to develop a better understanding of backup power capabilities at Health Centers and how Health Centers could be supported in expanding these capabilities. The primary goals of the project include assessing which Health Center sites have emergency power sources, the types of emergency power currently utilized by Health Centers, and building awareness of available options to increase resiliency, including but not limited to resilient power—solar photovoltaics paired with battery storage (solar+storage). This project builds on FACHC's longstanding commitment to support Health Center capacity for continuity of operations during emergencies and disasters, as well as requirements set forth by the Centers for Medicare and Medicaid Services (CMS) (CMS Emergency Preparedness Rule, 2019) and HRSA Expectations (PIN 2007-15).[2,3]

With support from Direct Relief and expertise from Clean Energy Group and Powered for Patients, a multi-step process was developed. The first step was to create and launch

2 "Emergency Preparedness Rule," *CMS.gov*, https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertEmergPrep/Emergency-Prep-Rule (accessed April 28, 2023).

3 "Health Center Emergency Management Program Expectations," *bphc.hrsa.gov*, August 22, 2007, https://bphc.hrsa.gov/sites/default/files/bphc/compliance/pin-2007-15.pdf (accessed April 28, 2023).

a survey to collect information at the organizational and individual site levels for Health Centers. The survey was launched in the summer of 2022 and introduced on a webinar with Direct Relief and project partners. Information collected via the surveys included current utilization of backup power resources, perceived barriers, and desire for expansion of backup power, as well as site specific information on services provided, current power sources (type, size, etc.), and critical functions.

As surveys were received, FACHC conducted follow-up interviews with respondents to collect additional insights and site-specific details. The next step in the process, which is currently

What is Solar+Storage?

Resilient power—solar photovoltaics paired with battery storage (solar+storage)—can provide a facility with continuous, reliable power in the event of a power outage. During times of regular grid operation, solar+storage can provide economic benefits, such as by offsetting grid electricity consumption and reducing demand for electricity during times of peak grid demand.

Battery storage system at a health clinic in Puerto Rico.
Photo: Clean Energy Group

In the event of an outage, solar+storage systems can provide automatic, reliable, and uninterrupted backup power. This automatic transition from grid-tied power to grid-independent power is facilitated by a transfer switch, which allows the solar+storage system and interconnected loads to disconnect (or "island") from the utility grid, and power the facility as a self-contained microgrid. As long as the sun is shining, a well-designed solar PV system can continue to recharge a battery throughout an outage. The battery provides backup power to a facility's designated critical loads; these critical loads can include common area support, such as lighting, as well as power to databases/computers for electronic health records and refrigeration for temperature-regulated medications and vaccines.

Although a battery can be charged from the grid, without onsite solar connected to the battery, it has limited capacity to provide power during an extended outage. Furthermore, unlike traditional diesel generators, solar+storage systems are more reliable, do not emit hazardous pollutants, and do not depend on fossil fuels—meaning they are immune to the fuel shortages common following a natural disaster.

To learn more about solar+storage, see Clean Energy Group's 2020 report, *Understanding Solar+Storage: Answers to Commonly Asked Questions about Solar PV and Battery Storage* at https://www.cleanegroup.org/publication/understanding-solar-storage/.

ongoing, involves assessing opportunities for resilient solar+storage at Health Center sites that indicated interest in additional and/or alternative backup power solutions. Through Direct Relief's Power for Health initiative, which launched in 2021 to help nonprofit community health centers and charitable clinics in the US maintain power and remain operational through increasingly common power outages resulting from disasters and electrical grid failures, Direct Relief has committed to funding the design and installation of resilient power systems for up to 15 Health Center sites (one location per organization) throughout Florida.

As this effort progresses, FACHC plans to share the insights gained to demonstrate the importance of emergency power for Health Centers and generate opportunities to enhance planning with regional coalitions, state and local emergency management, and hospital networks. FACHC also intends to use this information to explore potential financing options and funding streams for future projects through Hazard Mitigation Grants and other federal, state, and local programs. Over the long term, FACHC's goal is to see a significant increase (up to 20%) in the number of Health Center sites that utilize emergency power systems, thereby enhancing each location's capacity to continue operations and provide access to critical health center services during an emergency event.

FACHC plans to share the insights gained to demonstrate the importance of emergency power for Health Centers and generate opportunities to enhance planning with regional coalitions, state and local emergency management, and hospital networks.

BACKGROUND

Part 1: Power Outages and Health

Power outages are increasing in occurrence and duration in every region of the country. A major reason for these disruptions is more frequent and severe natural disasters. The public health implications of these outages are serious, especially for already vulnerable populations, including the elderly, medically fragile, and unhoused. Access to reliable and local health care is imperative, especially for vulnerable populations, in the event of an emergency and resulting power outage.

Weather-Related Power Outages

Compared to 2000-2010, weather-related power outages increased by 78% between 2011–2021.[4] This is especially true in the Southeast, which has had the most weather-related major outages since 2000.[5] In fact, Florida ranked sixth for most power outages over the past 20 years and first for the most utility customers impacted.[6,7]

Public Health Implications

Electricity is intrinsic to health care.[8] At least 2.7 million US residents rely on electricity-dependent medical equipment, such as oxygen concentrators and motorized wheelchairs. Over 185,000 of these vulnerable individuals live in Florida.[9] That number is likely much higher when factoring in those who require refrigeration for medications. Seniors, young children, and people experiencing homelessness are at increased risk when a power outage coincides with extreme heat, which happens frequently; during August of 2022, over one-third of the U.S. population was under an extreme heat warning.[10] For these residents, even a short-term outage can be life threatening.

4 "Surging Weather-Related Power Outages," *ClimateCentral.org*, September 14, 2022, https://www.climatecentral.org/climate-matters/surging-weather-related-power-outages (accessed April 28, 2023).

5 Ibid.

6 "The Most At-Risk States for Power Outages," *paylesspower.com*, https://paylesspower.com/blog/the-most-at-risk-states-for-power-outages (accessed April 26, 2023).

7 Based on data from 2021-2021. In 2022, Texas ranked first for most customers impacted by power outages after the 2022 winter grid failure.

8 To learn more about how power outages impact public health, see Clean Energy Group's report, *Home Health Care in the Dark* at https://www.cleanegroup.org/wp-content/uploads/Home-Health-Care-in-the-Dark.pdf.

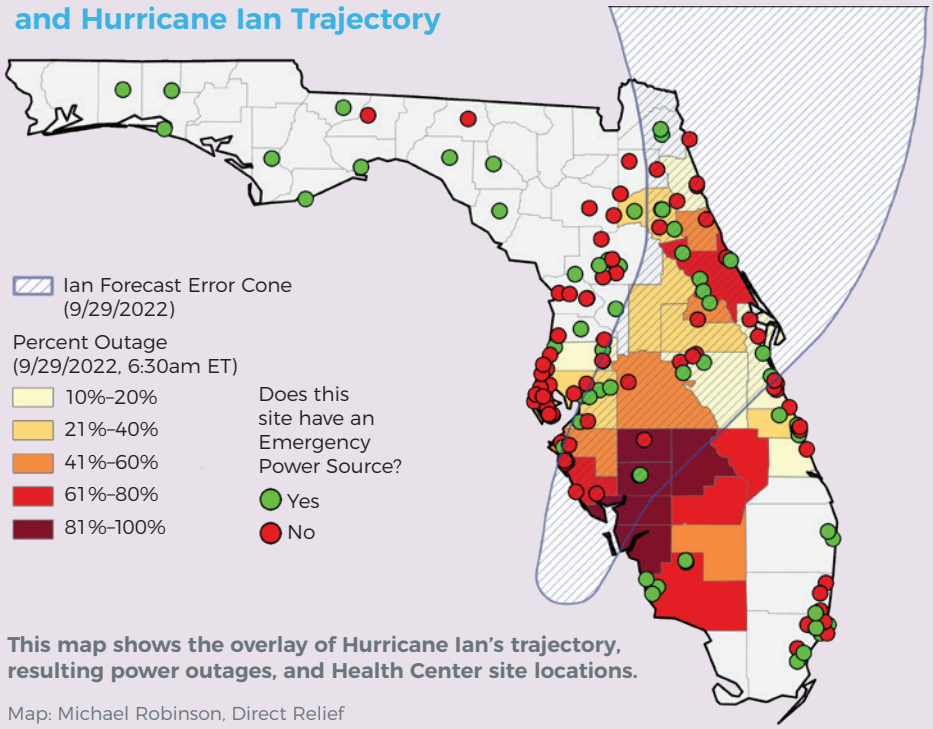
9 "Medicare At-Risk Populations by Geography," *HHS.gov*, April 21, 2023, https://empowerprogram.hhs.gov/empowermap (accessed April 26, 2023).

10 Dolce, Chris, "2021 Was Fourth-Warmest Year on Record for Contiguous U.S., NOAA Says," *weather.com*, January 10, 2022, https://weather.com/news/climate/news/2022-01-10-2021-united-states-fourth-warmest-year-noaa-report (accessed September 29, 2022).

Hurricane Ian: Power Outages, Public Health, and Emergency Response

On September 28, 2022, Hurricane Ian made landfall in southwestern Florida at Category 4 intensity. Hurricane conditions penetrated inland over portions of the peninsula and tropical-storm-force winds were experienced over a large portion of the state. Before moving offshore, Ian caused widespread power outages, affecting 3.28 million customers in Florida (see Figure 1). In the hardest hit areas, several Health Center closures were attributed to lack of power, in some cases extending up to two weeks. During the initial recovery, fuel supplies were limited, further contributing to supply chain and ongoing utility and generator disruptions. Almost 150 people died—some of whom died after power disruptions compromised their ability to utilize electricity-dependent medical equipment.

Figure 1
Health Centers, Power Outages, and Hurricane Ian Trajectory



This map shows the overlay of Hurricane Ian's trajectory, resulting power outages, and Health Center site locations.

Map: Michael Robinson, Direct Relief

Health Centers' response efforts to Hurricane Ian were bolstered by their emergency management programs and partnerships. While local and state resources and Federal Disaster Medical Teams were deployed through local channels, Health Centers worked to assess damages and impacts on their facilities, staff, and patients, many of whom had experienced losses due to the storm. NGO partners provided supplies and grant funds to provide immediate assistance. Health Centers utilized mobile units to provide care in the days, weeks, and months after the storm. As commonly seen in disaster impacted areas, recovery will be long-term and marked by inequities in housing, employment, and other social vulnerability factors further highlighting the need for ongoing access to community-based healthcare services.[11]

11 Peacock, Walter Gillis, Shannon Van Zandt, Yang Zhang, and Wesley E. Highfield, "Inequities in Long-Term Housing Recovery after Disasters," *Journal of the American Planning Association 80, no. 4* (October 2, 2014): 356–71. https://doi.org/10.1080/01944363.2014.980440.

Air and Marine Operations air crews respond to affected areas along Florida's coast after Hurricane Ian made landfall, September 30, 2022.

Photo: Ozzy Trevino

Health emergencies are made more dire by the fact that residents have difficulty accessing local care during an outage. Power outages threaten the ability of Health Centers to safely open and deliver services. Beyond basic facility support (such as lighting and heating/cooling), outages impact the ability of Health Centers to access digital health records and maintain cold-chain management of costly vaccines and medications.

Limited Local Emergency Care Resources

Health Centers integrate primary care access with pharmacy, mental health, substance use disorder, and oral health services in areas where economic, geographic, or cultural barriers limit health care access. These same areas are 1) disproportionately impacted by power outages and emergencies, and 2) subject to health disparities that can be exacerbated by disruptions in services, like in the event of a power outage.

However, in the event of a power outage, hospitals (and certain inpatient care facilities) are federally required to have access to a backup power system.[12] Investing in a backup power system capable of keeping a medical facility open is expensive and requires internal capacity to develop and operate. Without access to reliable backup power, many community care facilities, including Health Centers, are unable to remain open and operational in the event of an outage. Residents who are dependent on these facilities will often wait for a medical emergency before seeking care outside of their community, such as at a hospital. For rural residents, travel to a hospital may be long and dependent on reliable transportation, which is less available in low-income communities and communities of color. Hospitals also see a huge influx in demand for services during an emergency event, and some of these patients could likely be served more efficiently at a local Health Center site.

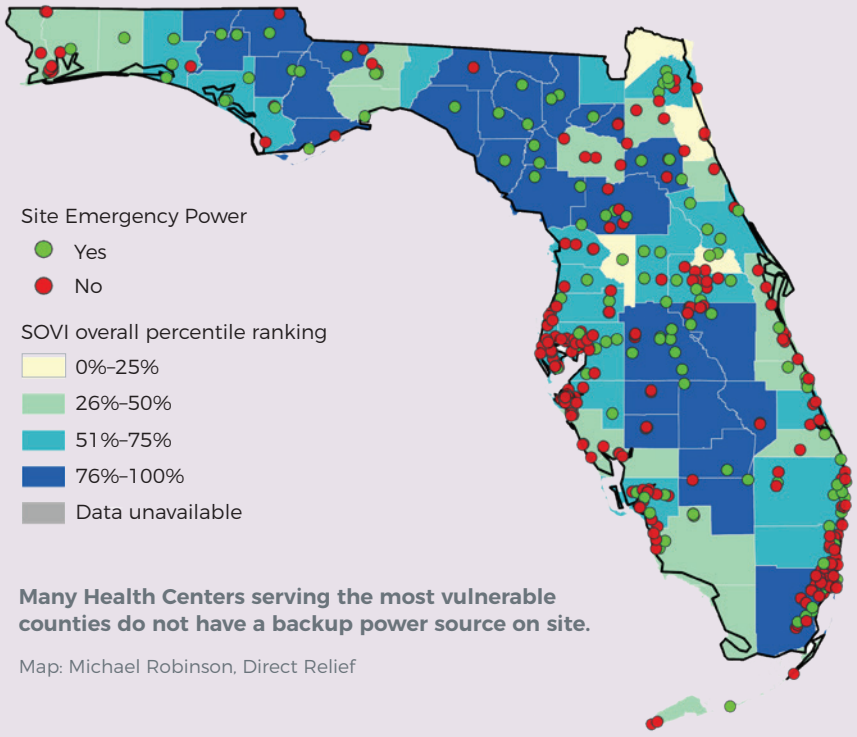
12 Historically, hospital backup power source regulations were specific to diesel generators, making it very difficult to develop solar+storage solutions. However, CMS recently released a ruling that "now permits normal and emergency power to be supplied by sources other than a generator or battery system, including a health care microgrid system." To learn more, the ruling can be found here: https://www.cms.gov/files/document/qso-23-11-lsc.pdf.

Social Vulnerability and Community Needs

The Social Vulnerability Index (SVI) is a database that helps emergency response planners and public health officials identify, map, and plan support for communities that will most likely need support before, during, and after a public health emergency.[13] Possible scores range from 0 (lowest vulnerability) to 1 (highest vulnerability). SVI data corresponds to populations that are characterized by factors like socioeconomic status, household characteristics, racial and ethnic minority status, or housing type and transportation, all of which may be considered in the identification of medically underserved communities, a requirement of the needs assessment that defines Health Center service areas. Figure 2 details the SVI for each county in Florida and maps where Health Centers are located and if they have an on-site backup power system.

Figure 2

CDC Social Vulnerability Index and Back Up Power at Health Center Sites



Many Health Centers serving the most vulnerable counties do not have a backup power source on site.

Map: Michael Robinson, Direct Relief

13 "SVI at a Glance," *atsdr.cdc.gov*, October 26, 2022, https://www.atsdr.cdc.gov/placeandhealth/svi/at-a-glance_svi.html (accessed April 26, 2023).

Bond Community Health Center, Inc. in Tallahassee, Florida is a Federally Qualified Health Center providing a patient-centered approach to quality primary and preventive healthcare services and support services ranging from eligibility assistance and transportation, to helping patients learn ways to eat healthier and live a longer, stronger life. Direct Relief has been a partner of Bond Community Health Center, Inc. since 2009, most recently donating funds to install a back-up generator system at their primary location, and also a mobile unit used for community outreach and disaster relief

Photo: Donnie Lloyd Hedden for Direct Relief

Part 2: Backup Power System Options

For the purposes of this report, the most utilized generator option—a diesel generator—is reviewed as well as solar and battery storage.

"Traditional" Backup Power Options

The go-to resource for backup power systems has been diesel generators. As of 2016, approximately 85% of commercial buildings and critical facilities utilized diesel for backup power. An additional 10% were powered by natural gas, with the remaining primarily powered by propane.[14] Having access to any backup power system is beneficial in the event of an outage. However, diesel generators have well-documented issues, including reliability concerns, toxic emissions, and vulnerability to fuel shortages.

14 Ericson, Sean and Dan Olis, "A Comparison of Fuel Choice for Backup Generators," *nrel.gov,* March 2019, https://www.nrel.gov/docs/fy19osti/72509.pdf (accessed April 26, 2023).

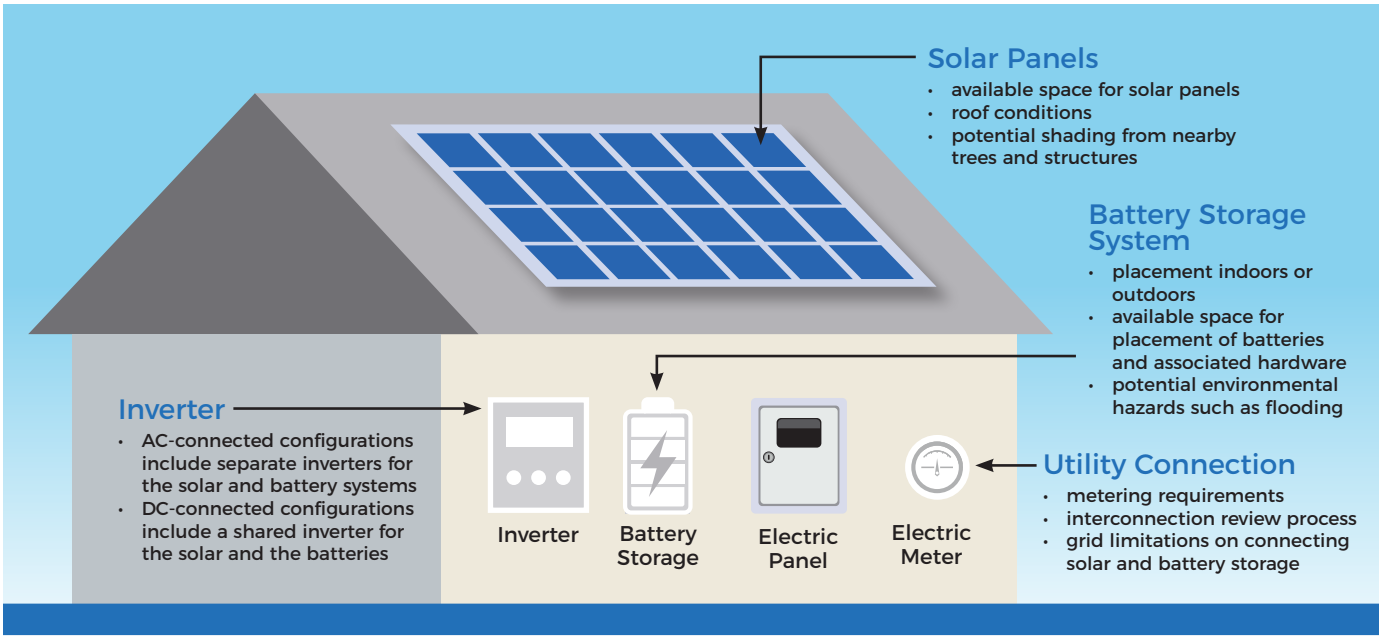
Resilient Power Solutions

Resilient power—solar paired with battery storage (solar+storage)—is a safe and reliable backup power source. In the event of a power outage, solar+storage systems can automatically provide continuous power to a facility (see Figure 3). Critical facilities with these systems installed have reported not even knowing the power was out because the system provided backup power so swiftly. If the sun is available, the batteries can keep recharging through the solar panels, offering potentially unlimited backup power. Solar+storage can be combined with existing and new fossil-fuel powered generators to create hybrid systems. In this instance, the combined system increases backup power duration, and the battery system actually helps the diesel generator operate more efficiently. To learn more about solar+storage, see the "What is Solar+Storage?" overview on page 8.

Solar+storage can be combined with existing and new fossil-fuel powered generators to create hybrid systems

Figure 3

Factors to Consider when Planning a Solar+Storage System



There are several important factors to consider when approaching a new solar+storage project: physical and structural barriers that may limit system siting and configuration, local permitting and safety requirements, and utility interconnection procedures. All these factors can impact the cost and feasibility of a planned installation.

Figure: Clean Energy Group

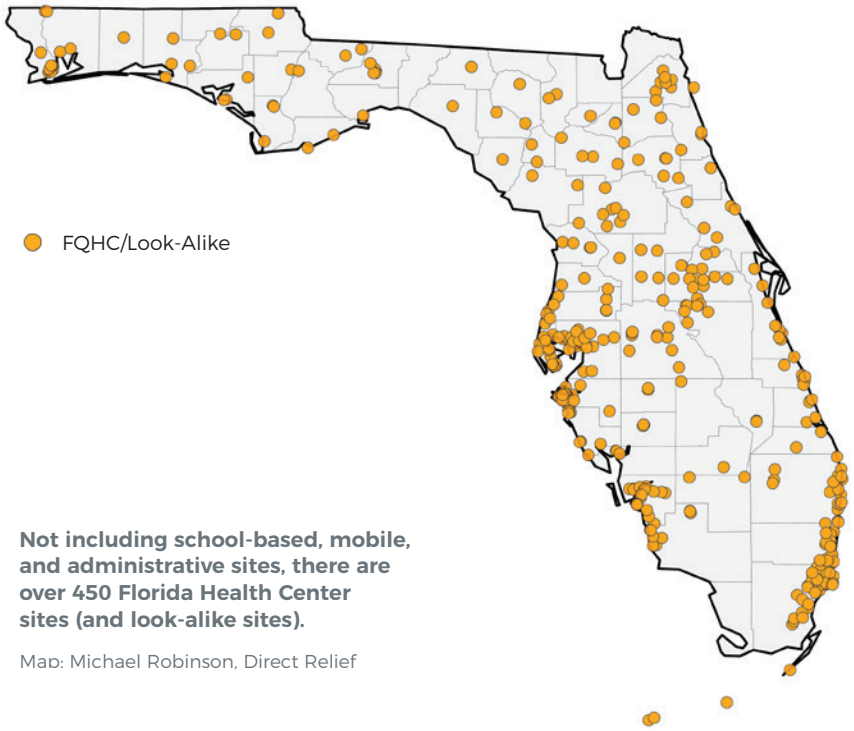
SURVEY RESULTS

Florida Health Centers Backup Power Capabilities

FACHC created a survey to better understand backup power resources and needs among Florida Health Centers, including perceived barriers and the desire for expansion, as well as site specific information on services provided, current power sources (type, size, etc.), and critical functions. The survey was shared with 50 Health Center organizations, which combined represent over 800 sites, including school-based sites and mobile units, across Florida. FACHC received a total of 32 responses, representing 59% of all Florida Health Center organizations—see Figure 4 to view the locations of Florida Health Centers (not including school or mobile sites). Site-specific information on 163 Health Center individual sites, approximately 36% of all Florida Health Center sites, was also provided.

Figure 4

Health Centers in Florida



Not including school-based, mobile, and administrative sites, there are over 450 Florida Health Center sites (and look-alike sites).

Map: Michael Robinson, Direct Relief

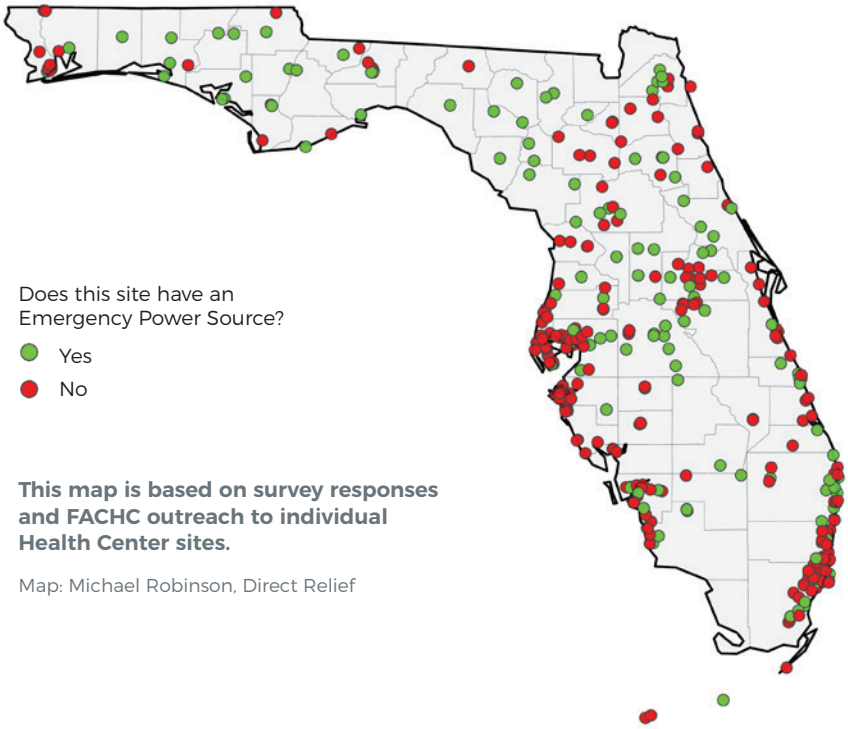
Key Takeaways: Health Center Survey

Most Health Center Sites Do Not Have an Emergency Power System

Despite Florida experiencing multiple outages and natural disasters each year, most Health Centers (over 60%) reported not having a backup power system on-site. Figure 5 shows Health Centers and which have on-site backup power systems.

Figure 5

Emergency Power Availability at Health Centers



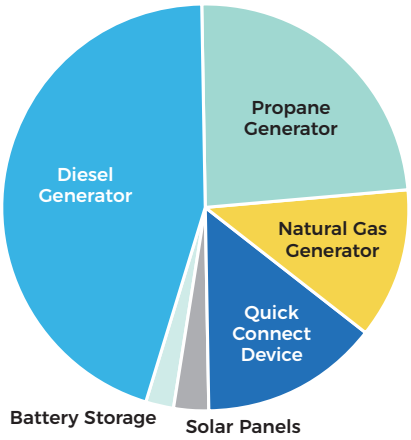
This map is based on survey responses and FACHC outreach to individual Health Center sites.

Map: Michael Robinson, Direct Relief

Figure 6

Health Center Backup Power Fuels Utilized

Source: FACHC



Health Center Sites that do have Backup Power, have Diesel

Of Health Center sites that reported having a backup power system, over 45% utilized an on-site diesel generator (see Figure 6). The remainder utilized propane (24%) and natural gas (12%) generators. Additional sites (14%) reported use of a quick connect device for a portable generator. Only two sites reported use of battery storage and one with use of solar, though additional solar projects may be underway.

Figure 7

Health Center Backup Power Fuels Considered

Source: FACHC

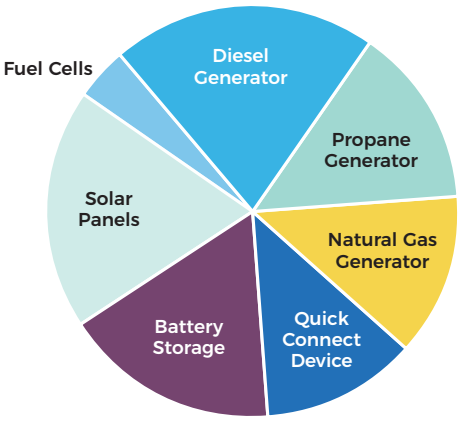


Figure 8

Health Center Barriers to Installing Backup Power Systems

Source: FACHC

Most Health Centers Want Backup Power on Site

A significant majority of Health Center organizations (84%) reported a desire to expand emergency power sources across their sites, 35% of which indicated a specific interest in solar and/or battery storage (see Figure 7). Yet, only 19% had identified potential partners or funding for expansion.

Barriers Identified

Health Centers reported multiple barriers to accessing a back-up power system (see Figure 8), including the following:

Economics. The cost of a backup power system was identified as the single largest hurdle by Health Centers, with almost 50% of respondents selecting "Installation Cost" as the primary barrier. Solar and battery storage, while becoming more affordable, are still expensive, and typically cost more than a diesel generator. Furthermore, the economic benefits of solar+storage, such as utility savings, require technical expertise to quantify.

Structure and Location. Thirty percent of Health Centers indicated that the facilities age and/or other vulnerabilities impacted their ability to move forward with backup power system investments. Structural issues, such as an old roof or outdated electrical wiring, can be so costly and time intensive to repair that a Health Center can't afford to move forward with a backup power system after the improvements have been made. Furthermore location vulnerabilities, like being in a flood plane, can make siting backup power especially difficult, as it needs to ensure the least likelihood that a flood will impact performance/ability to operate.

Knowledge and Capacity. Over 20% of Health Centers reported lack of knowledge or capacity to explore available backup power options as a primary barrier. Solar, and battery storage in particular, are newer technologies. While the market is growing, and more critical facilities are investing in resilient power, development of solar+storage is still limited. Furthermore, it

requires time and resources for organizations to explore solar+storage opportunities, costs, processes, and development.

Outages are Costly

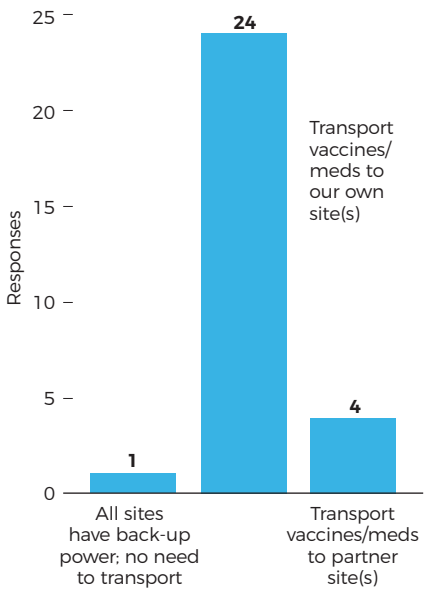
Survey respondents reported experiencing, on average, three outages per year. These outages aren't only harmful to public health, they're also incredibly costly for Health Centers, many of which are already operating on limited budgets. Among the 15 Health Center organization respondents that reported not having emergency power sources (representing a total of 123 sites), potential daily losses of up to $300,000 per day were reported, with an average of $41,000 in losses per day. Potential daily loss calculations could include loss of medication and vaccines, cancelled appointments, and staff related expenses.

Potential daily losses of up to $300,000 per day of power outage were reported by Health Centers, with an average of approximately $41,000 in losses per day.

Figure 9

Health Center Access to Backup Power for Vaccine Storage

Source: FACHC



The data in this table was collected at the organizatonal level, not the site level. The organizations that responded represent 352 individual health center sites.

Vaccine and Medication Refrigeration Storage is a Priority

More Health Centers store temperature-regulated vaccines and medication on site than have backup power capabilities to support this storage in the event of an outage. In fact, 83% of Health Centers reported having vaccines stored at individual sites. However, only 40% of those sites reported having backup power to maintain refrigeration in the event of an outage. The vast majority (60%) indicated that, in the event of an outage, they transport vaccines within their own network to facilities with backup power capabilities. Figure 9 shows the number of Health Centers that store vaccines and how they maintain refrigeration for those vaccines in the event of an outage.

SOLAR+STORAGE SITE SCREENING RESULTS

and Direct Relief's Power for Health Initative

Seventeen Health Center organizations indicated in their survey response that they were interested in moving forward with a solar+storage site screening. Two had to drop out due to ownership and ongoing construction issues, the remaining 15 each selected a site to receive a solar+storage screening through American Microgrid Solutions (AMS). This screening provided a preliminary technoeconomic analysis of solar+storage, including cost, siting, what percentage of the building solar+storage could support and for how long, and any estimated utility savings and electricity offset by solar. With support from Direct Relief's Power for Health Initiative, 15 individual site screenings were completed at no cost to the Health Center.

Table 1 on page 21 contains an overview of screening results for a selection of sites. The names and identifying information of the Health Centers have been redacted.

Considerations for Reviewing Site Screening Results

Fifteen Health Centers received a solar+storage site screening through the microgrid development firm, American Microgrid Solutions (AMS).[15] Of those 15, seven sites are represented in Table 1. The sites included in the table were selected based on facility square footage, so as to accurately portray solar+storage scenarios for Health Centers of different sizes. The total estimated cost of the system is *before* any qualifying rebates. It's anticipated that these facilities will qualify for a minimum of a 30% Investment Tax Credit, a federal tax credit for both nonprofits and for-profit entities to offset the costs of a solar and/or storage installation.[16] To learn more about available tax incentives, see the "Incentives" section on page 28.

Table 1 differentiates two durations of backup power estimates: "minimum" verse "typical." The minimum estimate is a worst-case scenario, meaning, the minimal amount of backup power the battery storage can provide. This worst-case scenario typically occurs when

15 AMS delivers hybrid power systems that improve security, savings, and sustainability for a wide range of facilities. To learn more about American Microgrid Solutions, see American Microgrid Solutions: www.americanmicrogridsolutions.com.

16 To learn more about various Investment Tax Credits, see Clean Energy Group's "Investment Tax Credit Fact Sheets" at https://www.cleanegroup.org/publication/investment-tax-credit-fact-sheets-bonus-credit-program.

Table 1

Solar+Storage Site Screening Results for Seven Health Centers

Site	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Site Size Category	**Small**	**Small**	**Medium**	**Medium**	**Medium**	**Large**	**Large**
Square Footage	6,480	7,824	15,000	21,000	24,000	49,722	53,000
Solar Size (kW)	22	24	31	64	51	68	74
Storage Size (kW/kWh)	57 / 129	24 / 54	56 / 126	168 / 448	61 / 148	73 / 194	45 / 102
Total System Costs	$308,000	$179,000	$327,000	$633,000	$401,000	$465,000	$390,000
Annual Utility Savings	$2,100	$3,400	$3,000	$7,300	$9,200	$12,500	$11,600
Annual Utility Cost Reduction (%)	20%	68%	18%	13%	14%	9%	15%
Duration Backup Power—Minimum (hours)	4	4	4	4	4	4	4
Duration Backup Power—Typical (hours)	14	14	9	8	8	8	8
Building loads supported during an outage (%)[a]	Full building	Full Building	Full building	Full building	30%	18%	18%
Annual CO_2 Emissions Reduction (metric tons)[b]	22	26	34	64	56	72	81
Replacement Costs (Year 12–16) & Operations and Maintence Costs[c]	$41,400	$19,200	$41,500	$147,000	$50,000	$64,300	$39,400

a A building load is the amount of electricity required by the facility. The amount of that load that can be supported by the solar+storage system in the event of an outage is represented as a percentage. In cases where this figure is not 100%, the facility selects the critical loads it would like the system to support.

b Figure based on the solar production alone and not the battery.

c Includes battery inverter/module replacements in year 12 and solar inverter replacements in year 16.

Fifteen Health Centers received a solar+storage site screening through the microgrid development firm, American Microgrid Solutions (AMS). Of those 15, seven sites are represented in Table 1 based on facility square footage so as to accurately portray solar+storage scenarios for Health Center sites of different sizes.

Source: FACHC

a facility has sustained, high electricity demand and has little-to-no solar production to recharge the battery. Alternatively, the typical duration of backup power is, on average, what the facility should expect for resilience at any point during the year. In either instance, both duration of backup power figures in Table 1 are based on zero solar contribution during a power outage. These estimates are therefore very conservative—it is more likely that sun will be available for the solar panels to charge the battery through an outage, extending the backup power duration of the system.

Finally, it is important to note that all Health Center sites that move forward with solar+storage through this project will have a hybrid backup power system—meaning a solar+storage system paired with a fossil-fuel generator. Some of the sites surveyed already had a generator that would be incorporated into the design, while others received a generator proposal. For the purposes of this report, the figures in Table 1 are representative of solar+storage findings only. The addition of a generator would significantly increase both minimum and typical backup power durations.

Key Takeaways: Site Screenings for Solar+Storage at Health Centers

The solar+storage screenings provided valuable insight into how solar+storage can serve Health Centers of various sizes, and at what cost.

Minimum Storage Duration

Across all facilities, battery storage alone can support a minimum of four hours of backup power to designated critical loads, enough to support Health Centers through a typical short-term power outage. As aforementioned, this estimate does not include any additional support from solar during an outage (an unlikely scenario in Florida, where solar is abundant the majority of the year).

Refrigerated medications at the Healthcare Network of Southwest Florida clinic in Naples, Florida on Monday, October 3, 2022.

Photo: Zack Wittman for Direct Relief

Loads Supported Determines Battery Size and Cost

There isn't a correlation between facility square footage and size/cost of the solar+storage system. Site 4 (see Table 1) will have the largest and most expensive solar+storage system, despite not being near the square footage of the categorically "large" facilities. This is primarily because it's a medium-sized facility that will have full building support (i.e., 100% of building load). The solar and battery storage are sized to support that demand and are therefore larger and more costly than systems at much larger facilities that will be supporting less load with their solar+storage system (e.g., Site 6 and Site 7).

Solar Savings and Replacement Costs

By design, annual utility savings from the system will offset any anticipated replacement costs necessary in years 12–16.

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NEXT STEPS
FACHC's Continued Support of Heath Centers

Health Centers that had a site screening and are interested in next steps will receive a comprehensive feasibility analysis for solar+storage through American Microgrid Solutions (AMS). AMS will also provide more information as to how fossil-fuel generators (existing and potential) can be incorporated and how that impacts the system design, economics, and performance. Direct Relief has committed to funding the design and installation for solar+storage systems for up to 15 Health Center sites (one location per organization).

FACHC is committed to supporting Florida's Community Health Centers in achieving their goals to expand the use of emergency power sources as a key component of ongoing efforts to increase resilience statewide.

FACHC is committed to supporting Florida's Community Health Centers in achieving their goals to expand the use of emergency power sources as a key component of ongoing efforts to increase resilience statewide. This involves exploration of all available options including traditional backup power, solar+storage, and hybrid models. FACHC will utilize the information collected through the surveys, interviews, and site visits, as well as the screenings to inform educational offerings and further conversations with potential partners and funders.

The information gathered through the solar+storage design and installation process will also serve as a business case for other Health Centers seeking emergency power expansion. Case studies will be created that outline the resilient power process for Health Centers in Florida. An example of a case study for a Health Center—CrescentCare in Lousianna—can be viewed on pages 24 and 25.

Case Study: CrescentCare

Solar+Storage at a Health Center

CrescentCare provides robust mental health, medical, and supportive services to the most vulnerable communities in the Greater New Orleans and Southern Louisiana area. The institution has almost 40 years of experience providing medical care to diverse populations. Prior to receiving designation as a Federally Qualified Health Center in 2013, CrescentCare was the NO/AIDS Take Force, a volunteer-led organization founded in 1983 in response to the HIV epidemic in New Orleans.[17]

Reliable backup power has been an increasing concern for CrescentCare as power outages, brought on by natural disasters and a dilapidated power grid, become more commonplace. New Orleans ranks in the top 10 for cities with power outages due to severe weather.[18] CrescentCare had existing diesel generators but had issues with system reliability during power outages and securing fuel during fuel shortages (which are common following a natural disaster). After Hurricane Ida, for instance, CrescentCare lost over $250,000 in medicines and vaccines as diesel generators failed across multiple locations.[19] In an effort to develop more reliable, efficient, and clean backup power resources, CrescentCare began exploring solar and battery storage options through the Together New Orleans Community Lighthouse initiative.[2]

In May 2023, CrescentCare will become the first solar and battery powered resilience hub in the Gulf South, and, through its partnership with Together New Orleans, become the state's first Community Lighthouse. To view the solar panels on the CresentCare facility, see the photo on page 25.

Later in 2023, the facility will also have a 500-kW natural gas generator installed. With this new capacity, backup power increases to six and a half days minimum and 10 days on average. Furthermore, solar+storage will likely be able to contribute above minimum and average estimates due to the likely availability of solar to charge the batteries. The facility also has the option to remove non-critical loads from system usage after outage; for example, removing conference rooms from battery power to help extend the life of the system during a long-term outage.

CrescentCare's Solar+Storage System Overview

Solar Size (kW): 128kW

Storage Size (kWh): 220kWh

Support Loads: 100% of facility, including refrigerated medications and vaccines, electronic health records, and essential medical equipment

Solar+Storage Cost: Approx. $600,000

Est. Utility Savings: $15,000–$21,000 annually

Solar+Storage Backup Power Duration: Minimum of 4 hours, 9 hours average—assuming no solar production is available to recharge batteries

Existing Generator: 200 kW diesel

Funding: $650,000 grant from Direct Relief

17 To learn more about CrescentCare and its rich history, visit https://www.crescentcare.org/about/who-we-are.

18 "Direct Relief Announces $650,000 Grant to Build One of Nation's Largest Solar Resilience Hubs in New Orleans," *CrescentCare.org*, September 13, 2022, https://www.crescentcare.org/direct-relief-announces-650000-grant-to-build-one-of-nations-largest-solar-resilience-hubs-in-new-orleans (accessed April 1, 2023).

19 Chavez, Roby, "Louisiana is Building Electricity Hubs to Power Communities After a Disaster. Here's How They Work," *pbs.org*, January 9, 2023, https://www.pbs.org/newshour/nation/louisiana-is-building-electricity-hubs-to-power-communities-after-a-disaster-heres-how-they-work (accessed April 1, 2023).

20 To learn more about Together New Orleans and the Community Lighthouse initiative, visit https://www.togethernola.org.

CrescentCare facility in Louisiana with solar panels installed.

Photo: Together New Orleans

REPLICATING THIS EFFORT
in More Communities and States

The sheer number of Health Center sites without emergency power systems emphasizes how important is is to replicate and expand on this effort. While Direct Relief's Power of Health Initiative has provided a unique opportunity for a select number of Health Centers to design and install a hybrid backup system that provides resilience, additional paths forward must be considered. FACHC will continue to seek out resources and support Health Centers in their efforts to develop and install a backup power system.

The sheer number of Health Center sites without emergency power systems emphasizes how important is is to replicate and expand on this effort.

Along with national partners, FACHC serves as an advocate for increased visibility of Health Centers as vital partners for broadening healthcare resiliency nationwide. Federal legislators have highlighted recent findings related to the prevalence of extreme weather events impact on healthcare organizations, what they are doing to respond and prepare for future events, and how they are assessing their climate impact and working to reduce their respective carbon footprint.[21] This signals how increasing emergency power sources, including solar+storage, is necessary, and calls for innovative approaches to funding and financing.

In an effort to replicate and build-upon this effort, and to further encourage resilient emergency power development at Health Centers, the following should be considered by state, federal, and health leaders.

Technical Assistance.
A primary reason why critical community facilities, such as Health Centers, have not explored backup power solutions is a lack of awareness around options and process. This is especially true for newer and technologically unfamiliar alternatives such as solar+storage. Technical assistance programs that cover the costs of exploring backup power options are imperative to supporting these facilities. For solar+storage, a feasibility assessment—like those being conducted at the fifteen Health Center sites—provides invaluable insight into both the process as well as site-specifics such as system design, economics, backup power duration, and operations and maintenance costs. The feasibility assessment can act as a first step, providing

21 "Health Care and the Climate Crisis: Preparing America's Health Care Infrastructure," Ways and Means Committee: Ranking Member Richard Neil .*house.gov*, https://democrats-waysandmeans.house.gov/health-care-and-climate-crisis-preparing-americas-health-care-infrastructure (accessed April 30, 2023).

Third-Party Financing Options for Solar+Storage at Health Centers

Third-party ownership financing options, such as leases and Power Purchase Agreements (PPAs), allow for facilities to finance systems with zero out-of-pocket costs. Federal incentives can be factored into third-party financing structures to help reduce overall costs for the facility.

Power Purchase Agreements (PPAs)

The Health Center would lease its roof to a third-party entity, which installs, owns, and operates a solar (or solar+storage) system, and the Health Center enters into a long-term contract to purchase the power generated by the system at a fixed rate. Under a PPA, the Health Center's agreement would be based on energy consumption at an agreed-upon fixed rate per kilowatt hour. This rate is typically lower rate than the customer would pay the utility.

Solar Leases

Similar to a PPA, the Health Center would sign a contract with a solar developer or installer to lease a system installed on the Health Centers roof for a specified period of time. Under a solar lease, the Health Center agrees to pay a fixed monthly rate to lease a system over time, regardless of how much power is generated or consumed.

Third-party financing options are not equally available across the United States. Florida, for instance, only allows for leases, not PPAs.

a report to facility owners that they can then use for next steps, such as assessing finance and grant opportunities and engaging a contractor to do the work.[22]

Mitigation Funding

The Federal Emergency Management Agency (FEMA) requires local governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects.[23] As nonprofits, Health Centers are eligible to apply for mitigation funding through their local working groups. Projects may include permanent and portable generators to address the hazards and vulnerabilities that may impact the Health Center sites and communities served. This funding should include and encourage solar+storage adoption for critical community facilities. Precedence for FEMA supporting solar+storage installations is evident in Puerto Rico following Hurricane Maria.[24]

22 To see an example of a technical assistance program for solar+storage, see Clean Energy Group's Technical Assistance Fund at www.cleanegroup.org/initiatives/technical-assistance-fund.

23 "Local Mitigation Strategy," *FloridaDisaster.org*, https://www.floridadisaster.org/dem/mitigation/local-mitigation-strategy/ (accessed April 30, 2023).

24 Hitchens, Kathy, "FEMA Approves More than $10.2 Million in Phase 1 Funds for Solar Microgrids in Puerto Rico," *microgridknowledge.com*, www.microgridknowledge.com/remote-and-island-microgrids/article/33002744/fema-approves-more-than-102-million-in-phase-1-funds-for-solar-microgrids-in-puerto-rico (accessed April 3, 2023).

Incentives

When the Inflation Reduction Act was signed into law in 2022, it created new pathways to solar+storage adoption through changes to the Investment Tax Credit (ITC), a federal tax credit program that provides tiers of incentives for solar and/or battery storage projects. Changes included alterations to the incentive structure and increased incentive amounts/categories. The new Direct Pay option, for instance, will now allow nonprofit organizations to receive the full financial benefits of the ITC as a direct payment. Previously, nonprofits, due to their tax-exempt status, had to navigate complicated processes to access the ITC that required them to pursue complex ownership and partnership structures that ultimately diluted the value of the ITC incentive.[25] Direct Pay is even more important now that the ITC incentives are more robust. What used to be a 26% ITC tax credit, is now a minimum of 30%. Furthermore, there are multiple adder incentives available that can be stacked on the 30% baseline, including a 10% adder for projects located in low-income communities.[26] Increased incentives and the Direct Pay option will greatly reduce the overall costs of solar+storage and make the economics much more favorable for nonprofits.

Innovative Financing Options

Through Direct Relief's Power for Health Initiative, up to 15 Health Center sites in this effort have the opportunity to access grant funding that covers 100% of the costs to develop and install a solar+storage system. This type of grant support is unusual and unlikely for the thousands of Health Centers operating across the U.S. Therefore, Health Centers will need to be able to access competitive financing to support their project. Third-party ownership financing options, such as leases and Power Purchase Agreements (PPAs), allow for facilities to finance systems with zero out-of-pocket costs. The benefits of third-party financing structures includes no upfront costs, reduced electricity costs, and no maintenance or insurance costs as the third party is responsible for the system. Adversely, facility owners typically see less energy savings in their pockets than they would if they outright owned the system. Furthermore, leases and PPA's can have long contracts and aren't currently available in every state.

25 Mango, Marriele, "The Inflation Reduction Act Is a Game Changer for Nonprofits Seeking Solar+Storage," *cleanegroup.org*, August 18, 2022, www.cleanegroup.org/the-inflation-reduction-act-is-a-game-changer-for-nonprofits-seeking-solarstorage (accessed May 2, 2023).

26 To learn more about various Investment Tax Credits, see Clean Energy Group's "Investment Tax Credit Fact Sheets" at https://www.cleanegroup.org/publication/investment-tax-credit-fact-sheets-bonus-credit-program.

RECOMMENDATIONS
for Health Centers and Their Partners

Health Centers interested in exploring reliable and resilient backup power opportunities must navigate a potentially complicated process in order to better understand what type of system to install, how it will serve their facility, how much it will cost, and who will install it. Health Centers can take steps to better understand their energy usage and expectations as to what a backup power system can support. Furthermore, partners can better support Health Centers in these efforts by understanding the needs of Health Centers (e.g. the survey conducted in this effort) and by building strategic partnerships that support resilient backup power expansion (such as with financing institutions, engineers, and so on).

With critical functions and site-specific factors in mind, Health Centers can explore a range of emergency power options, including a hybrid model (a system consisting of both a traditional generator and solar+storage) that supports redundancy.

Health Center Recommendations

Assessing Health Centers need for emergency power requires an understanding of a facility's current energy consumption and identifying what critical functions need to be supported, as well as opportunities to increase efficiencies. Site assessments may be expanded to include factors such as lighting, thermal comfort, indoor air quality, and preservation of medications and vaccine storage capabilities. The U.S. Department of Energy's Federal Energy Management Program's (FEMP) report on Integrating Health and Energy Efficiency in Healthcare Facilities outlines measures to align with guidance in the Healthy Buildings Toolkit.[27] Health Centers can consult this information and other available resources when assessing their facilities and opportunities for emergency power expansion.

With critical functions and site-specific factors in mind, Health Centers can explore a range of emergency power options, including a hybrid model (a system consisting of both a traditional generator and solar+storage) that supports redundancy. FACHC's ongoing efforts seek to support the identification of experienced partners and vendors in addition to potential funding and financing options.

27 Delgado, Alison, Kevin Keene, and Nora Wang, "Integrating Health and Energy Efficiency in Healthcare Facilities," *energy.gov*, June 2021, https://www.energy.gov/femp/articles/integrating-health-and-energy-efficiency-healthcare-facilities (accessed April 30, 2023).

Community Integration is a core function of Health Center Emergency Management programs. Relationships developed at the local level can be highly beneficial across all emergency management phases (mitigation, preparedness, response, and recovery). In addition to coordination and collaboration with public health partners, county emergency managers, and coalitions, Health Centers should actively participate in their Local Mitigation Strategy Working Group to learn more about the current priorities and opportunities to apply for mitigation funding to support emergency power projects.[28]

Partner Recommendations

Recognizing that access to care supports community resilience and backup power systems increase capacity for continuity of operations highlights why multi-stakeholder investments are crucial to establish a better understanding of emergency power needs among Health Centers. Primary Care Associations can solicit feedback from their members and explore opportunities for education and partnership development. With increased Health Center visibility, response agencies can more easily identify potential emergency power projects that align with local priorities. Continued and increased incentives offered at the utility, state and federal level can also accelerate the adoption of resilient power. Health Centers should be considered as priority sites for the installation of backup power systems and power restoration efforts during widespread outages and disasters.

28 "Hazard Mitigation Grant Program," *floridadisaster.org*, https://www.floridadisaster.org/dem/mitigation/hazard-mitigation-grant-program, (accessed April 26, 2023).

APPENDIX
Health Center Organizational Survey Participants

Aza Health*
Banyan Health Systems
Brevard Health Alliance
Broward Community and Family Health Centers
Camillus Health Concern*
Centerplace Health
Central Florida Health Care
Community Health South Florida (CHI)*
Citrus Health Network*
EmpowerU
Evara Health
Family Health Centers of Southwest Florida*
Family Health Source
Foundcare
Genesis Community Health
Healthcare Network of Southwest Florida*
Heart of Florida*
Jessie Trice Community Health System*
Langley Health Services*
MCR Health
Metro Inclusive Health
Miami Beach Community Health Center*
North Florida Medical Centers
Osceola Community Health*
Premier Community Healthcare Group*
Sulzbacher
Suncoast Community Health Center*
Tampa Family Health Centers
Treasure Coast Community Health*
True Health*
Walton Community Health Center
Whole Family Health Centers

* Health Centers with a site screened for solar+storage

Supporting Access to Health Care

Resilient Emergency Power for Florida Community Health Centers

MAY 2023

In 2022, the Florida Association of Community Health Centers (FACHC) set out to develop a better understanding of backup power capabilities at Health Centers and how Health Centers could be supported in expanding these capabilities. The primary goals of the project include assessing which Health Center sites have emergency power sources, the types of emergency power currently utilized by Health Centers, and increasing awareness of available options to increase resiliency, including but not limited to resilient power—solar photovoltaics paired with battery storage (solar+storage). This project builds on FACHC's longstanding commitment to supporting Health Center capacity for continuity of operations during emergencies and disasters as well as requirements set forth by the Centers for Medicare and Medicaid Services (CMS) (CMS Emergency Preparedness Rule, 2019) and HRSA Expectations (PIN 2007–15).

This report, prepared by Florida Association of Community Health Centers, Inc. (FACHC) and Clean Energy Group (CEG), with input and support from Direct Relief, examines current emergency backup power capabilities of Florida Health Centers, as well as opportunities for opportunities for solar+storage at Health Centers. The report includes technoeconomic survey results for installing and operating solar+storage at seven Health Centers of various sizes across Florida. The report concludes with a discussion of next steps for the Health Centers as well as recommendations for additional health centers and partners interested in replicating this effort.

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